Performance Evaluation of Long-Term Evolution- Advance (LTE-A) Networks for QoS in IPTV

A short term proposal submitted for the registration of Ph.D. in Computer Sciences.

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INTRODUCTION

As Internet generation accustomed to access broadband wherever they go, mobile broadband, instead of only at home and in the office, has become a reality. Therefore, the Global System for Mobile Communications family constantly develops new mobile technologies to achieve better performance, such as higher speed, larger capacity and so forth. LTE is a step beyond 3G and towards the 4G, evolved after EDGE, UMTS, HSPA and HSPA Evolution. The contributions of LTE make sure that the users are able to request more mobile applications like interactive TV, mobile video blogging, advanced games or professional services.

Particularly, **Long Term Evolution (LTE)** is a significant project of 3rd Generation Partnership Project (3GPP), as a transition from the 3rd generation (3G) to the 4th generation (4G), has achieved great capacity and high-speed of mobile telephone networks without doubt. It defines a new packet-only wideband radio with flat architecture and assumes a full Internet Protocol (IP) network architecture in order to assure voice supported in packet domain in design. In addition n, it is combined with top-of-the-line radio techniques in order to gain better performance than Code Division Multiple Access (CDMA) approaches.

One of the biggest challenges for the current IP based service is Quality of Service (QoS). As the rapid growth of multimedia application over Internet, it is required to maintain the QoS, which is ensuring the guaranteed service through Internet. For Example, Voice and Video services are bandwidth extensive, which requires less delay to maintain the QoS.It is not always possible to maintain the quality of all requirements. LTE Quality of Service (QoS) has become an important part of network planning & design when deploying 4G/LTE xed broadband wireless for data, video& voice services. There are subscribers who use LTE services for critical operations (e.g. voice calls, bank transactions, hospital operations), and there are subscribers who just want to enjoy premium Internet &applications experiences. LTE was designed to meet these increased data and application demands with reliable connections and low cost of deployment. A best case scenario would feature a highly QoS framework that is built to withstand future challenges.

REVIEW OF THE RELATED LITERATURE:-

There are many QoS factors that directly affect the performance of network and UE. The scheduling and power saving are two main factors that have gained greater importance after the introduction of newly emerging multimedia applications because these applications require more radio resources and consume high power for providing better QoS.

Scheduling Schemes

Scheduling is a process of allocating the physical resources among UEs and it guarantees QoS of multimedia service. The aim of a scheduling scheme is to maximize the overall system throughput while keeping fairness, delay and packet loss rate within QoS requirements. The scheduling decision scan is made on the basis of QoS parameters, Channel Quality Indicator (CQI), resource allocation history, buffer status both at the eNodeB and UE. The Best CQI (B-CQI) algorithm chooses the UEs that report the highest downlink Signal to Noise Ratio (SNR) values to corresponding eNodeB; thus, utilizes the radio resources efficiently among the UEs with good channel condition. On the other hand, the UEs experiencing bad channel conditions would never get resources [7]. As a result, overall system throughput increases but it outcomes in starvation of resources for some UEs specially the UE far away from the eNodeB. Thus, the B-CQI algorithm performs good in terms of throughput but poor in terms of fairness among the UEs. In order to cope with the fairness problem in B-CQI algorithm, the Round Robin (RR) algorithm was designed based on queues. It allocates the equal packet transmission time to each UE to meet the fairness [7]. As a consequence, the whole system throughput degrades because this algorithm does not consider channel conditions. To balance out the constraints of high throughput and fairness, the Proportional Fair (PF) algorithm was proposed. The scheduling strategies which are based on PF algorithm focus on tradeoff between maximum average throughput and fairness.

In [7],the packet scheduling algorithm proposed, which investigate QoS for real time services by 1) CQI feedback on uplink, 2) it assumes that every UE has limited buffer length and buffer status is also sent on the uplink that contributes in making the scheduling decisions, 3) treats real time and non-real time UEs traffic separately. This algorithm does not take into account packet delay as a result packet loss ratio may increase. In [1] the time and frequency domain scheduling is proposed, which is implemented in two layers to keep the fairness of radio resource and improve the throughput. In LTE, Guaranteed Bit Rate (GBR) and delay constraints are the key attributes that determine QoS but this scheme does not consider these factors. Despite these QoS methods for LTE, they do not take into account power saving mechanism, which is an important entity of LTE networks.

Scheduling in Time Domain

The TDPS phase is designed to assign priorities to scheduling candidate UEs for a particular TTI in a given cell. A candidate gets high metric value if it has stringent QoS requirements, better channel conditions and/or has been unable to obtain any significant resources in the recent past TTIs (fairness). The TDPS metric values are generated for each active UE by 'weighted Proportional Fair' (wPF) algorithm.

QoS Frequency Domain Scheduler

In this algorithm selects users based on their priority value and assigns a resource so that user's throughput can be maximized. If sorted users do not have good channel condition then remaining users are taken into consideration. Thus it can be given chance to the users having higher EBR to access the PRBs to achieve throughput with higher priority and it can improve its throughput. It will help in maintaining the fairness, in terms of corresponding of required data-rate, among users.

Proposed Downlink Scheduling Scheme

The proposed downlink scheduling scheme is different types of requested flows are marked by a classifier in the application sink and then are pushed into different queues in the medium access control (MAC) layer of the eNodeB. The main function of downlink scheduling is to intelligently assign the transmission rate and time-slot to different types of flows such that the QoS require-ments of different users can be satisfied. In LTE, the rate and time adaptation is implemented by resource blocks (RB) allocation.

In the proposed downlink scheduler, we give the highest priority to VoIP flows due to its highest sensitivity to delays. Packets in the VoIP queue are directly allocated to RBs in the beginning of each scheduling cycle. For video packets, we design two QoS-driven control modules: the transmission deadline control (TDC) module and the hand-off control (HOC) module. TDC module first computes the transmission deadlines of all the video packets according to the group-of-pictures (GOP) structure and current channel status, and up-dates the deadlines if needed in each scheduling cycle. Video packets will be allocated with RBs only when there is press-ing need for video transmission (i.e. video packets will miss their deadlines if not transmitted in the current scheduling cycle).

PROBLEM STATEMENT:

Quality of service is the biggest challenges for the 4G networks, also video is sensitive. This work study the Performance Evaluation of Long-Term Evolution- Advance (LTE-A) Networks for quality of service (QoS) in Internet Protocol Television IPTV using simulation tools to guaranty the best view of users.

OBJECTIVES OF THE STUDY:

- To study the parameters of the problem including (LTE, QoS)
- To explore different techniques already used for adapting QoS over LTE.
- To evaluate their efficiency considering the QoS.
- To come up with a novel technique that optimally solves the problem.
- To validate the proposed technique using a simulation model.
- To state related factors that could be enhanced in the future.

METHODOLOGY:

- Literature Survey.
- Studies on different techniques for layered video over LTE network.
- .Theoretical analysis of the existing Algorithms.
- Suggestion of new Algorithm or enhance the existing Algorithms.
- Test new algorithm and validate through simulation.
- Using any simulator for testing and validate the algorithm.

FINDINGS:-

After completing the work findings will be given.

CONCLUSION AND SUGGESTION:

After completing the work conclusion will be drawn and suggestion will be given.

REFERENCES:

[1] Nilam Dhameliya, Rajni Bhoomarker, Sameena Zafar, "QUALITY OF SERVICE PARAMETER CENTRIC RESOURCE ALLOCATION FOR LTE-ADVANCED " IJRET: International Journal of Research in Engineering and Technology eISSN: 2319-1163 | pISSN: 2321-7308.

[2] Md. Showket Hossen, Md. Neharul Islam, "QoS Performance Evaluation of Video Conferencing over LTE" School of Computing at Blekinge Institute of Technology.

[3] M. Sajid Mushtaq, Abdussalam Shahid and Scott Fowler, "QoS-Aware LTE Downlink Scheduler for VoIP with Power Saving" 2012 IEEE 15th International Conference on Computational Science and Engineering.

[4] Liwen Zhang, f Prof. Raj Jain, "A Survey of Long Term Evolution" "http://www.cse.wustl.edu/~jain/cse574-10/ftp/lte.pdf".

[5] Chong Lou, Ling Qiu, "QoS-Aware Scheduling and Resource Allocation for Video Streams in e-MBMS towards LTE-A System" 978-1-4244-8327-3/11/$26.00 ©2011 IEEE.

[6] Dandan Wang, Robert Soni, Pichun Chen, Anil Rao, Alcatel-Lucent "Video Telephony over Downlink LTE Systems with/without QoS Provisioning" 978-1-61284-680-4/11/$26.00 ©2011 IEEE.

[7] Qian Liu, Zixuan Zou, Chang Wen Chen "QoS-driven and Fair Downlink Scheduling for Video Streaming over LTE Networks with Deadline and Hard Hand-off" 2012 IEEE International Conference on Multimedia and Expo.

Researcher **Guide**

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